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# Avalanche Notes

U.S. Forest Service  
Westwide Avalanche Network

APRIL 1993

## Weather

April snowfall was within 20% of normal in much of the mountain West, but was much heavier in Colorado. Along the West Coast, Mt. Rainier, WA, recorded 117% of normal, while Alpine Meadows, CA, got 84%. In Utah, Alta reported 118%, and Snowbird, 95%. In Colorado, a storm on the 19th-20th dropped 16-20" at several sites, and an upslope storm on the 12th-13th dropped 20" at Bear Lake in Rocky Mountain National Park. Arapahoe Basin had measurable snow on 24 days and wound up with 135% of normal. Gothic, too, had 135%, while Winter Park got 170%; Berthoud Pass, 175%; and Copper Mountain, 190%. In Alaska, Alyeska recorded 26" on the 1st-2nd, but wound up with only 68% of normal. A warm-up in the Alyeska area on the 25th-28th produced a cycle of large wet slab avalanches: Alyeska observed several slabs that fractured 10-12 feet deep and fell 2000 vertical feet.

## Avalanches

All of the significant avalanche incidents came early in April. On April 3-9, a rash of avalanche accidents -- five in all -- claimed six lives in the western U.S. and Alaska. Three events came on the 3rd.

April 3, Gakona Glacier, AK: Three snowmobilers were traveling this glacier 150 miles NE of Anchorage. One triggered an avalanche, was swept 2000 feet vertical, and was buried deeply in a crevasse. His body will probably never be recovered.

April 3, Odyssey Mt., Chugach Range, AK: A 28-year-old competitor in the World Extreme Skiing Championships was standing near the start gate at the top of the mountain and holding onto a bamboo pole when a shallow avalanche knocked his feet out from under him. This led to a cornice collapse, which in turn triggered a larger avalanche on the slope below. The victim fell more than 1000 feet down a rocky chute and was killed by head injuries.

April 3, Wasatch Range, UT: Five backcountry skiers entered Wolverine Bowl by rappelling from the ridge to reach skiable terrain. The second man down triggered a small pocket of soft slab. This triggered a large avalanche further down, which swept the victim to the runout and buried him. Rescuers with beacons located the man and dug him out from 6-8 feet of snow. He never regained consciousness and died four days later.

April 8, Crested Butte, CO: A 42-year-old pro patroller was skiing alone and triggered an avalanche in an out-of-bounds area. Later, when he failed to answer his radio, another patroller followed the ski tracks into the fresh avalanche, did a beacon search, and located the victim shallowly buried against a tree. Death was apparently due to a head injury.

April 9, Buffalo Mt., Summit County, CO: A party of four backcountry skiers triggered a soft slab avalanche that totally buried two and partially buried a third skier. The two buried victims were wearing beacons and were uncovered in about 30 minutes. One was later pronounced dead at the site, and the other was flown to a Denver hospital where he died two days later.

A total of 12 incidents were reported in April, resulting in 16 people caught, 4 partly buried, 5 buried, and 6 killed.

### MARCH REVISITED

We just recently learned of a fatal avalanche that occurred in March in New York. On or about March 13, a man and wife were driving their pickup truck along State Route 280, which parallels the Hudson River north of New York City. They became stuck in snow and abandoned the truck. While walking along the roadway, a natural avalanche released and totally buried the man. Hours later his body was recovered by rescuers, some of whom were West Point cadets.

### WINTER SUMMARY

Table 1 lists avalanche statistics for the past 20 winters. This year was above average in all categories except estimated property damage. The 27 deaths are a modern-day record for the U.S.

Table 2 presents snowfall totals for all Westwide sites that submitted weather data for the 4-month period of December-March. Alaska, the Cascades, and the northern Intermountain zone received below-normal snows, while the rest of the West was deep with white.

Table 3 lists avalanche totals for all sites reporting this winter.

Table 1: Annual avalanche summaries for the U.S.

WINTER	AVALANCHES	PEOPLE				VEHICLES		AVALANCHE DAMAGED			ESTIMATED	
		C	B	I	K	BUR	DAM	BLDGS	LIFTS	MISC	PROPERTY	DAMAGE
1992-93	10,342	194	87	11	27	47	11	15	0	0	\$	392,000
1991-92	5,522	150	66	17	18	13	8	0	1	2		70,000
1990-91	7,049	134	54	12	8	8	2	2	0	1		160,000
1989-90	6,122	141	58	16	8	14	8	3	0	3		150,000
1988-89	7,385	143	55	4	7	33	6	2	0	8	2,216,000	
1987-88	5,338	148	50	13	8	7	5	2	0	25		650,000
1986-87	5,036	128	62	13	23	5	0	3	0	1		175,000
1985-86	7,437	102	49	11	15	18	7	6	1	3		150,000
1984-85	6,903	115	42	18	14	8	0	4	0	2		80,000
1983-84	7,161	122	42	20	14	27	7	4	0	6		140,000
1982-83	11,822	174	68	20	14	32	11	5	4	3		80,000
1981-82	10,102	212	78	16	19	77	25	10	8	8	1,700,000	
1980-81	5,695	131	58	7	23	5	1	0	2	0		10,000
1979-80	10,669	136	44	9	6	34	16	7	1	19		650,000
1978-79	9,420	159	62	16	11	54	24	5	1	4	1,250,000	
1977-78	11,151	155	71	16	17	19	5	5	3	2		300,000
1976-77	3,764	98	35	13	10	3	0	2	0	0		500
1975-76	7,905	177	81	15	17	13	6	1	1	1		100,000
1974-75	10,387	195	79	9	22	30	5	4	1	2		150,000
1973-74	11,782	159	92	13	13	54	16	11	2	7		300,000
AVERAGE	8,050	149	62	13	15	25	8	5	1	6	\$	436,000

Table 2: Snowfall totals for the winter of 1992-93

<u>State and Site</u>	<u>Dec-Mar (inches)</u>	<u>% of Normal</u>	<u>Nov-Apr (inches)</u>	<u>% of Normal</u>
Alaska				
Alyeska	336	91%	493	99%
Eaglecrest	180			
California				
Alpine Meadows	468	179%	501	152%
Heavenly Valley	310			
Kirkwood Meadows	579		707	
Squaw Valley	352	155%	363	135%
Sugar Bowl	532			
Colorado				
Arapahoe Basin	243	117%	376	
Aspen Highlands	202	124%		
Aspen Mountain	238	149%		
Aspen Snowmass	187			
Bear Lake	175		277	
Beaver Creek	281	135%		
Berthoud Pass	253	125%	407	133%
Breckenridge	215	106%		
Copper Mountain	243	140%		
Crested Butte	198	122%		
Eldora	133			
Gothic	383	167%	504	156%
Keystone	194		290	
Loveland Basin	278	124%		
Monarch	263	141%	343	
Purgatory	288	160%		
Red Mountain Pass	269	130%		
Steamboat	308	130%		
Sunlight	221	127%		
Telluride	213	118%		
Vail	283	108%	447	
Winter Park Ski Area	306	122%		
Winter Park Town	203	137%	308	137%
Wolf Creek	332	125%		
Idaho				
Schweitzer Basin	180			
Sun Valley	202	145%		
Montana				
Big Mountain	211	87%		
Big Sky	162	85%		
Bridger Bowl	152	68%		
New Mexico				
Taos	240	139%		
Oregon				
Mt. Hood Meadows	261	80%	335	
Utah				
Alta	406	114%	576	115%
Snowbird	338	102%	521	111%
Washington				
Alpental	193			
Crystal Mountain 1	207	87%		
Crystal Mountain 2	192	65%		
Mt. Rainier-Paradise	309	67%	517	80%
Snoqualmie Pass	185			
Stevens Pass	238	75%		
Stevens Pass U.S. 2	220			
Wyoming				
Jackson Hole	298	106%		

Table 3: Avalanche totals for the winter of 1992-93

Ski Areas	No.	Highways, Mines, Nat. Parks and Backcountry Areas	No.
1. Alpine Meadows, CA	1270	1. Red Mountain Pass, CO	331
2. Alta, UT	1146	2. Gothic, CO	264
3. Squaw Valley, CA	774	3. Berthoud Pass, CO	121
4. Stevens Pass, WA	659	4. Snoqualmie Pass I-90, WA	113
5. Snowbird, UT	608	5. Stevens Pass U.S. 2, WA	98
6. Kirkwood Meadows, CA	403	6. Colorado Highway 110, CO	59
7. Bridger Bowl, MT	396	7. Loveland Pass, CO	40
8. Aspen Snowmass, CO	362	8. Urad-Henderson Mine, CO	33
9. Alyeska, AK	359	9. Lizard Head Pass, CO	24
10. Crystal Mountain, WA	352	10. Wolf Creek Pass, CO	12
11. Mt. Hood Meadows, OR	313	11. Teton Pass, WY	9
12. Big Sky, MT	285	12. Mt. Rainier Nat. Park, WA	7
13. Sugar Bowl, CA	263	13. Vail Pass, CO	2
14. Aspen Highlands, CO	252		
15. Heavenly Valley, CA	213		
16. Alpental, WA	198		
17. Jackson Hole, WY	196		
18. Telluride, CO	127		
19. Wolf Creek, CO	125		
20. Arapahoe Basin, CO	121		
21. Taos, NM	108		
22. Crested Butte, CO	97		
23. Big Mountain, MT	95		
24. Mt. Rose/Slide Mt., NV	74		
25. Loveland Basin, CO	58		
26. Monarch, CO	55		
27. Mammoth Mountain, CA	49		
28. Sun Valley, ID	46		
29. Vail, CO	38		
30. Breckenridge, CO	33		
30. Copper Mountain, CO	33		
32. Winter Park, CO	32		
33. Grand Targhee, WY	31		
34. Aspen Mountain, CO	29		
35. Steamboat, CO	18		
36. Sunlight, CO	8		
37. Beaver Creek, CO	3		



U.S. FOREST SERVICE  
WESTWIDE WEATHER AND AVALANCHE NETWORK  
FORT COLLINS, COLORADO

APRIL 1993  
SUMMARY OF WEATHER AND SNOW CONDITIONS

AREA	SNOWFALL				WATER EQUIVALENT								SNOW DEPTH				TEMPERATURE			WIND SPEED AND DIRECTION															
	TOTAL SNOW- FALL IN.	AVG DEN	MAX		TOTAL WATER IN.	MAX 24 HR.	IN.	D A	NUMBER OF DAYS				D A	T MIN	AVG IN.	MEAN MAX	MEAN MIN	AVG F	AVG FOR MO. MPH	6 HOUR PERIODS		FASTEST HOUR	D A												
			IN	D					T	GE	GE	GE								1	2			5	1	0	IN.	E	IN.	IN.	15	20	MPH	DIR.	E
CENTRAL AND SOUTHERN ROCKY MOUNTAINS																																			
ARAPAHOE BASIN, COLO	70.6	.07	8	13	5.18	.85	13	17	12	3	0	90	25	78	83	32.3	10.7	21.5	14.9	56	21	36	250	11											
BEAR LAKE, RMNP, CO	48.6	.08	15	13	4.06	.95	13	11	8	2	0	78	13	59	66	30.8M	19.0M	24.9M	--	--	--	--	--												
BERTHOUD PASS, COLO	93.9	.07	10	3	6.41	1.00	19	18	12	3	1	92	20	72	82	31.5	13.6	22.5	14.0	53	21	33	230	11											
COPPER MTN, COLO	79.5	.06	11	25	5.01	.80	25	16	10	4	0	79	20	66	70	38.7	14.3	26.5	19.3M	87M	51M	41	270	11											
GOTHIC, COLO	58.5	.08	11	19	4.56	1.18	19	12	9	2	1	89	6	69	81	36.2	17.8	27.0	--	--	--	--	--												
KEYSTONE, COLO	62.3	--	10	19	--	--	--	--	--	--	--	--	--	--	--	35.8M	12.8M	24.3M	7.2M	1M	0M	--	--	--											
MONARCH, COLO	28.3	.07	7	3	1.99	.55	3	6	5	1	0	--	--	--	--	37.3M	16.4M	26.8M	--	--	--	--	--												
VAIL, COLO	85.3	.08	14	25	6.68	1.25	25	16	10	5	1	--	--	--	--	28.7M	15.1M	21.9M	8.3M	7M	1M	--	--	--											
WINTER PARK 1E, COLO	64.4	.08	10	13	4.99	.95	13	15	10	3	0	69	20	54	59	43.2	21.6	32.4	--	--	--	--	--	--											
INTERMOUNTAIN																																			
SNOWBIRD, UTAH	66.5	.10	13	19	6.86	1.41	19	13	9	4	3	96	3	70	84	43.3	24.0	33.6	22.4	95	74	--	--	--											
WEST COAST																																			
ALPINE MEADOWS, CAL	26.5	.14	8	1	3.81	.99	18	6	5	4	0	131	1	103	118	44.2	28.8	36.5	27.7	96	83	75	260	4											
ALYESKA, ALASKA	57.1	.09	16	1	10.38	1.38	16	14	11	7	2	135	2	98	117	41.5	31.5	36.5	5.0	0	0	15	140	19											
HEAVENLY VALLEY, CAL	18.0	--	6	1	--	--	--	--	--	--	--	118	1	84	104	44.8	23.1	34.0	--	--	--	--	--	--											
MT. HOOD MDWS, ORE.	28.5	.19	7	11	8.35	1.93	3	16	13	5	1	118	24	101	109	--	--	--	--	--	--	--	--	--											
MT. RAINIER PARADISE	89.0	.13	17	11	12.41	1.52	11	24	22	8	3	151	11	119	140	36.1	23.9	30.0	7.6	13	1	26	260	29											
SQUAW VALLEY, CALIF	9.7	.16	4	1	2.99	.94	9	5	4	3	0	84	1	34	63	48.5	24.9	36.7	--	--	--	--	--	--											
STEVENS PASS SE WASH	20.5	.29	5	19	7.99	1.48	19	10	9	7	3	62	1	45	55	40.8M	29.4M	35.1M	--	--	--	--	--	--											
SUGAR BOWL, CALIF	35.0	--	9	18	--	--	--	--	--	--	--	265	6	250	259	46.5	26.1	36.3	10.9	55	32	40	220	17											

-- DATA INCOMPLETE OR MISSING

M-ONE OR MORE DAYS OF RECORD MISSING-IF AVERAGE VALUE IS ENTERED, LESS THAN 10 DAYS RECORD IS MISSING

IF M IS ENTERED IN WIND SPEED COLUMN, LESS THAN 37 6-HOUR PERIODS ARE MISSING

GE--GREATER THAN OR EQUAL TO

U.S. FOREST SERVICE  
WESTWIDE WEATHER AND AVALANCHE NETWORK  
FORT COLLINS, COLORADO

APRIL 1993  
AVALANCHE SUMMARY

AREA	TOTAL	TOTAL	DATES OF		NUMBER OF DAYS WITH		TYPE OF		AVALANCHE		FRACTURE LINE HEIGHTS IN FEET			VERTICAL DESCENT IN FEET				AVALS ACROSS MAJOR ACCESS ROADS NO.				
	A	A	F	L	MAX IN ONE DAY NO.	D	A	S	L	N	H	S	O	GE	GE	GE	MAX					
	V	V																				
	A	A																				
	S	S																				
THIS MONTH NO.	THIS WINTER NO.	T	T	E	-----NUMBER-----	-----NUMBER-----	2	4	6	200	500	1000	FEET									
CENTRAL AND SOUTHERN ROCKY MOUNTAINS																						
ARAPAHOE BASIN, COLO	9	121	1	21	4	21	4	0	7	2	0	9	0	0	9	3	1	8	6	1	1200	0
ASPEN SNOWMASS, COLO	34	362	2	26	11	6	6	0	33	1	3	31	0	0	1	0	0	32	0	0	465	0
BERTHOUD PASS, COLO	11	96	8	19	4	19+	4	0	1	10	0	11	0	0	2	0	0	11	5	0	500	0
CRESTED BUTTE, COLO	3	97	5	8	2	6	2	0	3	0	0	3	0	0	2	0	0	3	1	0	800	0
GOTHIC, COLO	41	264	6	30	10	28	12	0	0	41	0	2	5	34	4	1	1	41	33	14	1800	0
MONARCH, COLORADO	1	55	10	10	1	10	1	0	0	1	1	0	0	0	1	1	1	1	1	0	600	0
RED MTN PASS U.S.550	21	331	3	25	7	8	9	0	7	14	1	14	0	6	4	1	1	11	6	3	3000	3
STEAMBOAT SPRNGS, CO	8	18	3	14	5	3	2	0	8	0	2	0	0	6	2	0	0	7	0	0	200	0
WINTER PARK S.A., CO	6	32	1	11	3	11+	2	0	0	6	0	6	0	0	3	0	0	3	0	0	300	0
WOLF CREEK, COLO	5	125	6	6	5	6	1	0	5	0	0	5	0	0	2	0	0	1	0	0	300	0
INTERMOUNTAIN																						
BRIDGER BOWL, MONT	57	396	5	11	28	11	3	0	51	6	0	57	0	0	0	0	0	57	37	5	1100	0
GRAND TARGHEE, IDAHO	13	31	7	15	11	12	3	0	13	0	0	11	0	2	8	1	0	9	6	1	1000+	0
JACKSON HOLE, WYO	10	196	5	5	10	5	1	0	10	0	0	10	0	0	2	0	0	10	9	0	700	0
WEST COAST																						
ALPINE MEADOWS, CAL	60	1270	4	24	18	24	5	0	58	2	0	60	0	0	3	0	0	58	20	0	700	0
ALYESKA, ALASKA	69	359	1	28	18	18+	9	0	54	15	3	55	5	6	46	14	12	69	67	44	2000	0
CRYSTAL MTN, WASH	6	352	2	2	6	2	1	0	6	0	0	0	6	0	0	0	0	6	5	0	650	0
KIRKWOOD MDWS, CAL	60	403	1	24	23	18	4	0	56	4	1	59	0	0	11	0	0	60	20	0	800+	0
MT. HOOD MEADOWS	11	313	7	18	4	11	4	0	11	0	4	7	0	0	5	0	0	5	4	0	650	0
SQUAW VALLEY, CALIF	53	774	1	24	23	18	4	0	53	0	1	52	0	0	5	0	0	34	1	0	500	0
SUGAR BOWL, CALIF	19	263	1	18	11	18	2	0	19	0	1	18	0	0	1	1	0	17	8	0	600	0

-- = DATA INCOMPLETE OR MISSING  
GE = GREATER THAN OR EQUAL TO  
+ = ALSO OCCURRED ON OTHER DATES